

CLAIMS

1. An intelligent brain rescue instrument for identifying, monitoring, and
guiding the application of brain therapies to patients with evolving brain injuries,
5 comprising:

1) input means for acquiring a set of a multiple number of signals each
indicative of a different biochemical or biophysical parameter of the patient, said set
of signals including a multiple number of signals selected from:

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- (a) an EEG signal;
 - (b) an ECG signal;
 - 15 (c) a signal indicative of brain tissue impedance of the patient;
 - (d) signal or signals indicative of the temperature of the patient;
 - (e) signals indicative of the arterial blood pressure and/or arterial oxygen
20 saturation, of the patient;
 - (f) a signal indicative of intracranial pressure;
 - (g) a signal or signals indicative of any of cerebral blood flow, cerebral blood
25 volume, cerebral oxygenation, or cerebral metabolite measures;
 - (h) a signal or signals indicative of systemic glucose concentration and/or
central glucose concentration;
 - 30 (i) a signal or signals indicative of systemic lactate concentration and/or
central lactate concentration;
 - (j) a signal indicative of cerebrovascular status;

- (k) a signal indicative of cerebral cytochrome levels;
- (l) a signal indicative of the patient's heart rate;
- 5 (m) a signal indicative of central cytotoxic activity;
- (n) a signal or signals indicative of movement or muscle activity;
- (o) a signal or signals indicative of any other biochemical or biophysical
10 parameter useful as indicative of the current or as predictive of the future brain
state of the patient; and

- II) computing means configured to continuously sample and process each of
the acquired signals, and

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- display to a user on a monitor information a selected subset of the acquired
parameters, said selected subset of parameters which is displayed being selected
either by system software, including signal analysis modules arranged to perform
initial signal processing and analysis and brain rescue task modules arranged to
20 process data from the signal analysis modules and embodying expert analytical
rules, as parameters having values indicative or predictive at any time of actual or
potential future deterioration of the brain state of the patient, with said parameters
being displayed against a scale or scales or in a way which highlights to a clinician
any variations of the parameters indicative or predictive of the deterioration of the
25 brain state of the patient to enable identification, monitoring, and guiding of the
application of brain therapies to a patient with an evolving brain injury, or
alternatively being override selected at any time by the user.

2. An intelligent brain rescue instrument according to claim 1, wherein the
30 computing means is configured to store data collected over several days in relation
to at least some of the selected parameters and the system software embodying
expert analytical rules is arranged to identify variations in said parameters
occurring over a period of a number of hours or days as well as short term events
occurring over a number seconds.

3. An intelligent brain rescue instrument according to either one of claims 1 and 2, including hardware and/or software filters to minimise noise and/or artefacts or interference in the input parameter signals.

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4. An intelligent brain rescue instrument according to any one of claims 1 to 3 wherein said expert system software is configured to identify and ignore artefacts and interference in the input parameter signals.

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5. An intelligent brain rescue instrument according to any one of claims 1 to 4 including a software based advisor or help system arranged to provide expert advice based on rules or models in the software to assist a clinician.

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6. An intelligent brain rescue instrument according to any one of claims 1 to 5 including means for data reduction and storage of historic parameter information.

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7. An intelligent brain rescue instrument according to any one of claims 1 to 6 wherein the system software is arranged to identify and indicate fault conditions indicated by at least some of the input signals.

8. A method for identifying, monitoring, and guiding the application of brain therapies to patients with evolving brain injuries, comprising:

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1) acquiring a set of signals each indicative of a different biochemical or biophysical parameter of the patient, said set including a multiple number of signals selected from:

(a) an EEG signal;

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(b) an ECG signal;

(c) a signal indicative of brain tissue impedance of the patient;

(d) signal or signals indicative of the temperature of the patient;

- (e) signals indicative of the arterial blood pressure and/or arterial oxygen saturation, of the patient;
- 5 (f) a signal indicative of intracranial pressure;
- (g) a signal or signals indicative of any of cerebral blood flow, cerebral blood volume, cerebral oxygenation, or cerebral metabolite measures;
- 10 (h) a signal or signals indicative of systemic glucose concentration and/or central glucose concentration;
- (i) a signal or signals indicative of systemic lactate concentration and/or central lactate concentration;
- 15 (j) a signal indicative of cerebrovascular status;
- (k) a signal indicative of cerebral cytochrome levels;
- 20 (l) a signal indicative of the patient's heart rate;
- (m) a signal indicative of cytotoxic activity;
- (n) a signal or signals indicative of movement or muscle activity;
- 25 (o) a signal or signals indicative of any other biochemical or biophysical parameter useful as indicative of the current or as predictive of the future brain state of the patient; and
- 30 II) via computing means:
- (a) continuously sampling each of the acquired signals; and

(b) displaying to a user on a monitor information on a selected subset of the acquired parameters, said selected subset of parameters which is displayed being selected by system software, including signal analysis modules arranged to perform initial signal processing and analysis and brain rescue task modules arranged to process data from the signal analysis modules and embodying expert analytical rules, as parameters having values indicative or predictive at any time of actual or potential future deterioration of the brain state of the patient, with said parameters being displayed against a scale or scales or in a way which highlights to a clinician any variations of the parameters indicative or predictive of the deterioration of the brain state of the patient to enable identification, monitoring, and guiding of the application of brain therapies to a patient with an evolving brain injury.

9. A method according to claim 8, wherein said monitoring is carried out continuously over a period of at least twelve hours.